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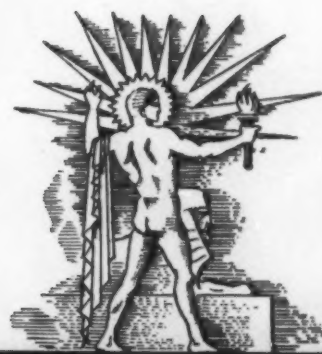
# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



## Unusual Infant

See Page 36



JANUARY 19, 1935

A

SCIENCE SERVICE PUBLICATION

## SCIENCE NEWS LETTER

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The Weekly



Summary of

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## DO YOU KNOW?

The age of a meteorite can be calculated from its helium and radium contents.

Heavy water, recent chemical discovery, boils at 214.5 degrees Fahrenheit instead of 212.

Bethel, now being excavated by archaeologists, is mentioned more frequently in the Bible than any other town in Palestine, except Jerusalem.

Russian archaeologists are unearthing Sarkela, a ninth century city in Crimea, and the only known town of the Chezar, a Tartar tribe that adopted Judaism.

Egypt may try the "mole" draining system used in Florida's Everglades, to aid in fighting a human disease caused by a worm which infests snails in flooded areas of the Nile Valley.

Demonstration classes on cooking goat and mutton were recently held by Government teachers, to show Navajo Indian girls how to combine modern cookery and nutrition knowledge with their own ancient customs.

Three carloads of science exhibits from the Century of Progress have been acquired by the Buffalo Museum of Science.

When the Wright brothers made their famous test flight at Kitty Hawk, 1903, they tossed a coin to see which brother would have the privilege of going up first.

Indian children attending boarding schools have been reduced from 22,000 to 13,000 in the Government's new educational policy of sending the children to day schools.

Evidence that long-eared owls do migrate, contrary to belief, was found recently when an owl banded April 22, 1934, in California was shot by a hunter in Ontario, 2,000 miles away, October 9, 1934.

The Federal Food and Drug Administration is spending nearly a third of its time and money protecting the public from danger of poisons used in sprays to combat insect pests and diseases that attack fruits and vegetables.

## WITH THE SCIENCES THIS WEEK

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Why should you not use a curling iron in the bathroom? p. 46.

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How can you rid your lawn of dandelions? p. 40.

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Is it natural for children to lose skills they have learned? p. 36.

What practical value may the recording of brain waves have? p. 35.

## PUBLIC HEALTH

About how many cases of influenza have there been this year? p. 39.

Does an influenza epidemic mean high pneumonia deathrate? p. 40.

How much spotted fever vaccine was made last season? p. 46.

## PSYCHOLOGY

# Electric Currents Picked Up From Head Show Brain Action

Scientists Hope That "Electroencephalograms" May Prove as Useful as the Now Common Electrocardiograms

**B**RAIN waves, electrical impulses accompanying brain activity, promise to allow physicians to probe harmlessly into the brain processes of healthy and ill patients in much the same way that heart function is now extensively charted in the familiar electrocardiograms.

The tapping for medicine of the electrical messages from the brain comes as the culmination of long years of research on the physiology of the brain and particularly the character of the electricity within the skull.

The latest work is by Drs. H. H. Jasper and Leonard Carmichael of the psychological laboratory of Bradley Hospital and Brown University, who followed up and confirmed in many particulars the researches of Dr. Hans Berger of Jena. The German scientist found that the changes in electrical potential connected with human brain activity may be magnified by running them through a vacuum-tube amplifying system similar to that used in radios and then using the enhanced current to operate an oscillograph which writes in light on a photograph a wavy line corresponding to the fluctuations of the electricity in the brain.

Drs. Jasper and Carmichael reported their findings in an article titled "Electrical Potentials from the Intact Human Brain" (*Science*, Jan. 11, 1935).

## "Electroencephalograms"

"Electroencephalograms" the wavy line records of brain action are called, corresponding to electrocardiograms, which is the term applied to the familiar and similar records of heart actions.

Drs. Jasper and Carmichael declare that electroencephalograms may well "prove significant in psychology and clinical neurology."

It is not necessary to penetrate within the head to obtain the brain current records, although in some of Dr. Berger's earlier work it was thought necessary to insert needle electrodes through the skin. The patient simply wears on his head next to the skin some harmless pieces of metal that act as electrodes

to pick up, without any sensation on the part of the patient, the brain currents.

Two kinds of brain waves were detected by Dr. Berger. The biggest waves Dr. Berger called alpha waves, giving to the smaller ones the name of beta waves. The alpha waves, Dr. Berger found, became smaller when the patient was under certain types of anesthetic, during an epileptic seizure, and when the person being studied did a "mental" problem or had his senses stimulated. The waves are their largest when the person is relaxed.

Alpha and beta waves were also detected by Drs. Jasper and Carmichael. In addition they found another type of wave which appeared when the subject's senses were stimulated by light or sound. Further experiments may show that waves of this type are irritation or stimulation waves.

The frequency of the alpha waves does not vary much from day to day in the same person, the investigators found. In one or two cases of illness, the frequency of these waves was very low.

Some normal persons, and especially sick persons, show different frequencies or lack of synchronism between the functioning of one side of the brain and that of the other. One girl, who was subject to "fits" or convulsions and who was quite ambidextrous, had an alpha-wave frequency of ten per second on the left side of her head and of but six to eight across the right side.

Others who have worked on these brain phenomena include Dr. E. D. Adrian, the British scientist who shared the 1932 Nobel prize in medicine. Working with Dr. B. H. C. Mathews, he found the waves in the brains of rabbits, while Dr. Pawdicz Neminski as early as 1925 found similar action potentials in dog brains.

Dr. Berger's work showed that there is no direct relationship between the brain waves and the pulse, and that even a momentary arrest of both breathing and heart beat has no marked effect on the brain potentials.

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## DENTISTRY

## Annual Fee for Dentistry Would Prevent Tooth Loss

**A** PLAN for dental care which would make unnecessary the loss of a single tooth was presented by Dr. Raymond Bristol, New York City dentist, to the First District Dental Society of the State of New York at its meeting in New York City.

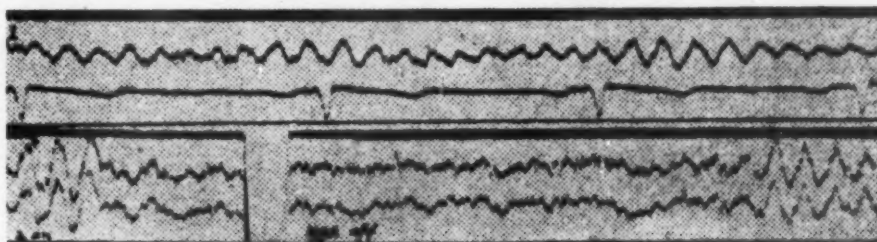
The patient, under Dr. Bristol's plan, would pay his dentist a fixed fee each year and would report at regular intervals to have his teeth cared for. The dentist would regularly examine and clean the teeth and correct such defects as appeared within the period of the maintenance contract.

"One difficulty in putting the plan into operation is the sad state of the average patient's mouth when he presents himself to the dentist," Dr. Bristol said.

The cost of putting the patient's mouth into good condition could not be considered part of the maintenance contract.

Nine-tenths of all persons in moderate circumstances would be eligible and acceptable to the dentist under the plan, he concluded.

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### BRAIN WAVES

The photographic record made by the electric impulses accompanying brain activity. The top line shows the alpha waves in a relaxed subject. The second line shows the pulse. Below, the two records, taken across different parts of the head, show the effect of light stimulation. This illustration accompanied the report by Drs. Jasper and Carmichael in *Science*.



PSYCHOLOGY

# Girl Twins Repeat Famous Experiment of Jimmy-Johnny

**At 15 Months, Trained Baby Can Do Many Stunts While Untrained Twin Sister is Helpless at Them**

**A** 15-MONTHS-OLD baby climbing fearlessly up a high steep incline, climbing unaided off stools as high as a grown person's head, and beginning to navigate on roller skates was watched by a group of scientists, educators, and others at a demonstration of the remarkable effects of special psychological training at the Normal Child Development Clinic of the Babies Hospital in New York City.

Florie, the athletically trained baby, is one of little twin girls who are repeating the experiment of Jimmy and Johnny, the famous boy twins one of whom was trained to swim, dive, roller skate, and do other feats at an age when other babies are just beginning to toddle around. Her twin sister, Margie, who looks so much like Florie that it is difficult to tell them apart, has been brought up without any special training, and has had her activities restricted. Like Jimmy, the untrained boy twin, she was not able to do any of these stunts although given plenty of opportunity to try. (*SNL*, Dec. 9, 1933)

Florie is said by Dr. Myrtle B. McGraw, the psychologist who has trained her, to be in these respects more like the famous Johnny than she is like her own twin sister. The baby girls are otherwise very much alike and are probably what are known to scientists as identical twins, that is, they had their origin in one single cell. In appearance and other inherited characteristics they are so much like one another that even their parents sometimes confuse them.

Their remarkable differences in ability to do the athletic stunts is clearly a result of the difference in their training, Dr. McGraw believes.

Florie and Margie are now only fifteen months old, but they are not quite so well developed as the average baby that age because they started life under the handicap of a premature birth. Like the Dionne quintuplets they came into the world nearly two months before their time.

Florie for this reason did not start her athletic training as early as did

Johnny. Instead of being only 20 days old when she began her exercises, Florie was 26 days old.

Now she is a charming little blue-eyed toddler, not saying anything yet but greeting strangers with a grave stare, and friends with a bright smile. She can toddle about fairly well, and finds it very thrilling to be able to walk. But when she occasionally loses her balance and flops down she will continue her way on all fours, just as well content with that mode of locomotion.

The learning to walk is at present so exciting to Florie that it is engaging practically all of her attention at the expense of her more unusual abilities, Dr. McGraw says.

Florie, like Johnny, has been taking a "memory course." Her teachers put

the baby on a stool and let her watch them hide a cookie or some fascinating toy. After a short time, Florie is released and allowed to go hunt the hidden object. She was picking up the game very well—not always going right to the toy, but at least hunting in "warm" places nearby to it. But when she started to walk, this ability was temporarily lost. Now she will watch the process of hiding with great interest and get down from her stool and start in the right direction, but as soon as she realizes that she is walking, the hunt is off and the walking gets all her attention.

Forgetting in this way is just as much a part of development as is learning, Dr. McGraw explained. Parents and teachers should not be worried when children after learning something suddenly seem to lose it all. The loss is usually only temporary and is caused by the interference of the learning of other new things. It is only after the new skill is mastered that the child is able to go back and re-learn the former skill and perhaps bring the two together.

How to run a kiddie car is one of the skills that Florie has temporarily lost in this way. Learning to use the legs independently to operate a tricycle or



FLORIE JUMPING TO DR. MCGRAW



FLORIE COMING DOWN THE SLIDE

kiddie car is very difficult for a young child, Dr. McGraw has found. Johnny tried in vain for seven months to learn this difficult feat, although his twin brother Jimmy when considerably older learned it without so much trouble.

For this reason, Florie was started out on the kiddie car. At first she would just sit on it and shake it without any attempt to push it. Gradually, however, she learned to push with her feet and make it go backwards, and at last was beginning to get the idea of propelling it forward when she learned to walk. Now she just sits on it without any attempt at locomotion in this way.

Every baby, Dr. McGraw has found, is all the time developing along many different lines. Sometimes these lines of growth converge and the one activity is a help to the other. Sometimes, however, they seem to cross, and the learning in one line interferes with the learning in another.

### Study Brain

Dr. McGraw's studies of the learning of babies has been paralleled at the Babies Hospital by studies by Dr. Frederick Tilney of the structure of the brain

at different ages or stages of development.

The baby does not have a brain ready to function when he comes into the world. In fact, he probably does not have much use of the higher thinking centers of the brain, the brain cortex, until he is a year old.

This result of minute study of the structure of the brains of mammals, including humans, at various stages of development beginning long before birth and reported by Dr. Frederick Tilney, director of the Neurological Institute, Columbia University, to the same meeting.

What a child is able to do, whether he can walk or talk, whether he can learn to spell, whether he can even smell, see, and hear depends upon the stage of development of the brain and nervous system, Dr. Tilney has found.

At the very beginning, all the cells of the brain are like little round buds, capable of doing nothing except just lying there and growing. Little by little the buds begin to blossom out into mature cells. But they do not grow up at the same rate. Some areas of the brain and some types of cells grow up much sooner than others. Thus at birth

the animal has some parts of its brain completely developed, other parts in the unfolding stage, and still others in the bud stage not yet begun to unfold.

Learning to walk depends only partly upon the development of the leg muscles. It depends more upon control or direction of the muscles. The legs must work with the feet, and the toes with the feet and legs. More than that, the eyes must help too in guiding the progress, and the body must be kept in balance. All this cooperation between the senses and the many body muscles is made possible by the brain and nervous system.

The first part of the brain to develop is the area controlling what scientists know as the body sense. It is this sense that lets you know where your hands and legs are and what they are doing. Without it anyone is completely helpless. He could not move or even be aware of what he might be doing. In a disease of the brain, locomotor ataxia, this area of the brain is affected, and patients suffering from it gradually lose all ability to get about. At first they try to compensate for the loss of this important sense by watching carefully with the eyes, noting just where the foot is and where it moves in taking a step. In the final stages they are utterly helpless.

In the normal human infant, this part of the brain has begun to develop four months before birth.

Dr. Tilney has watched and recorded scientifically the behavior of mammals such as the rat, the pig, and the cat, and then examined the brain microscopically until he is able now to take sections of the brain of an animal and without any further information tell what that animal was able and what it was not able to do.

In the same way it will be possible to detect differences between the brains of humans of differing degrees of intelligence—between the genius, the normal man, the moron, and the imbecile. The brains of the feeble-minded are like those of undeveloped children, their brain cells are still in the bud stage.

Models of the brain, built up to be scientifically exact duplicates of the originals but on an enlarged scale, were demonstrated by Dr. Tilney to the audience, and the intricate process of making them was explained.

The animal brain is first set in celloidin and then sliced to make sections of almost transparent thinness. Every fifth one of these slices is stained and mounted on a slide to show up the various textures. Each one is then placed in a machine which projects it enlarged



onto a sheet of paper. There it is traced by Dr. Tilney. For a single brain it may be necessary to make as many as three hundred of these drawings although the whole brain of the immature animal may not be as large as a golf ball.

From colored wax of uniform thickness are cut little pieces exactly to match the drawings, the color corresponding to the particular texture of the brain area. Then these wax slices are assembled to form the complete brain model, exact in every detail and colored to indicate the development of the brain material.

Dr. Tilney now has over one hundred

of these models, graphically demonstrating the nature of the brains of six different mammals, including man, at many stages of development from the time when the brain has any structure at all up to maturity.

He now plans to make such a model of the brain of a scientist and inventor who has willed his brain for this research. He expects this study to be of great interest because of the great intelligence of this well-known man and also because of the peculiar fact that the man was tone deaf, that is, he could not distinguish one note from another when he heard music.

*Science News Letter, January 19, 1935*



MARGIE

PHYSICS

## Triple Weight Hydrogen Made From Lithium Atoms

**N**EW experiments in which triple hydrogen—three times as heavy per atom as the ordinary kind of hydrogen gas—is formed are reported from famous Cavendish Laboratory of Cambridge University.

The new discovery is the work of Prof. James Chadwick and Dr. M. Goldhaber. (*Nature*, Jan. 11).

The triple weight hydrogen was formed in experiments where slow neutrons were passed through paraffin after being liberated by a source consisting of radon gas and the element beryllium. This is a common neutron source used widely throughout the world.

The slow neutrons thus formed were allowed to strike the light element lithium having atomic weight six. The neutrons have an atomic weight of nearly one.

The combination of lithium atoms and neutrons may, by one picture, form an unstable form of lithium of weight seven. This lithium seven explodes violently and forms a helium atom of atomic weight four plus a triple weight hydrogen atom of mass three. Five million electron volts of energy come off in the explosion in addition, reported Prof. Chadwick and Dr. Goldhaber.

The current report on triple weight hydrogen is the fourth announcement about this rare type of isotope which exists in ordinary hydrogen in only about one per 10,000 million.

Lord Rutherford with Drs. M. L.

Oliphant and P. Harteck reported work in the spring of 1934 indicating that hydrogen of mass three was formed in atomic reaction experiments.

Drs. M. A. Tuve, L. R. Hafstad and Odd Dahl of the Department of Terrestrial Magnetism of Carnegie Institution of Washington followed shortly with the announcement that triple weight hydrogen existed in a stable condition in ordinary hydrogen.

Prof. Wendell Latimer and Dr. Herbert Young of the University of California, using the magneto-optic method of analysis, detected hydrogen three.

Finally came the work of the group at Princeton University confirming the results reported by Lord Rutherford and by the Carnegie Institution investigators. Working at Princeton were Drs. Gaylord P. Harnwell, Henry D. Smyth, Walker Bleakney, W. Wallace Lozier, P. T. Smith, S. N. VanVoorhis and J. B. H. Kuper.

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METEOROLOGY

## Atmospheric Stagnation Was Cause of Long Fog

**"S**TALLED air," a persistent stagnation in the atmosphere, with the country largely blanketed with a great warm air mass, was the cause of the fog that grounded airplanes, slowed

rail schedules and caused auto wrecks for several days during the second week in January, says C. L. Mitchell of the U. S. Weather Bureau.

A long drift of warmed air from the southwest brought about a condition of general cloudiness and thin rains. This, in itself, is not an abnormal or unusual occurrence in winter, Mr. Mitchell explained. What brought the fog was the apparent inability of this sluggish air mass to move.

The fog came because the heated moist air condensed over the cooler land and water of the Northeast. Such condensation occurs because of the presence of microscopic particles in the air which serve as nuclei. Atoms in the atmosphere from which one electron has been removed so that they become electrical ions are a common type of nuclei. Dust and soot particles from many chimneys also form convenient places at which moisture in the air can condense.

The dense fogs found in industrial cities known as "smoggy" weather—a combination of the words smoke and foggy—occur for this last reason.

Much of the recent fog in the East may have been due to this "smog," for during the winter the air is especially filled with ash and unburned coal particles.

The foggy condition was general over practically the whole of the Appalachian mountain region and the Atlantic seaboard. Fog was reported from as far west as Omaha; but the trans-Appalachian region was not under a continuous shadowy blanket.

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## ARCHAEOLOGY

# Rush to Save Indian Relics Before Flood at Dam

**T**HIRTY ancient Indian villages and numerous island graveyards along the lower Columbia River have been explored by science, in a race with time against flooding of a 60-mile area by waters of Bonneville Dam.

Herbert W. Krieger, of the Smithsonian Institution staff, has just returned from Washington and Oregon where he spent six months on this emergency expedition.

The region proves to have been thickly settled by American natives. In one valley, now arid and given over to sagebrush, the ethnologist counted and mapped remains of more than 500 houses, as dense a settlement as he had ever encountered.

This discovery supplements reports of Lewis and Clark, who journeyed up the river over a hundred years ago and mentioned the sparse and scattered habitations of the Indians. Lewis and Clark,

says Mr. Krieger, saw only fishing camps and summer settlements along the banks. Winter homes of the people were in more sheltered places, away from the wind tunnel which sends gales along the river.

Islands in the river were graveyards of these Indians. Some buried their dead under big sheds. Other communities piled the dead under canoes. One island graveyard, visited by Mr. Krieger, had been swept by fire so completely that even glass beads were fused, and charcoal lay all over the place. Inquiring among old inhabitants, he learned the story that early white settlers had turned the Indian cemetery into a crematory.

Flattening pliant foreheads of young babies was the regular practice of these Indians, said Mr. Krieger. Every one of these ancient Indians, if in fashion, had this artificial flatness. Again con-

sulting people with long memories, the archaeologist was told that the Cascade Indians used to hold christening day on a regular date, at a cove on the Washington shore of the Columbia near Cape Horn. Indian squaws brought their babies, with the little heads tightly bound, and at the ceremony the bandages and boards were removed. The flattening was all completed within the first few months of life.

One clue to antiquity of the villages and burials was found in a fir tree stump. The fir tree had sprouted and grown up in the center of an abandoned Indian house. A few years ago, woodsmen chopped off the tree, leaving the stump, and Mr. Krieger counted 257 rings of annual growth in this tree ring record. Many of the ruins are believed to be much older than this would indicate.

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## PUBLIC HEALTH

## Influenza Cases Increase Throughout the Country

**I**NFLUENZA cases throughout the country increased from 2,889 to 4,965 during the first week of the new year, reports of 38 state health officers to the U. S. Public Health Service show.

These official reports do not give a true picture of the influenza situation, public health officials point out. Actually there may be 49,000 or more cases of the disease. The reported number of cases must be multiplied by five or ten or more in order to get anything like a true idea of the amount of influenza present in the country, since so very many cases of this disease never get reported, even during epidemics.

Confusion of influenza with colds and grippe adds to the difficulty of determining the amount of influenza in the country. Influenza is a much more severe ailment than grippe, while the latter is more severe than the common cold, health officials in Washington, D. C., explain.

Another fact that makes it difficult for health officials to size up the influenza situation is that this disease is not officially reported in three very populous states—Massachusetts, New York and Pennsylvania.

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Harvard's Fatigue Laboratory will send an expedition to a valley in India, 17,000 foot elevation, to study respiration and circulation in the inhabitants.



### SLIDING FOR FUN IS OLD, OLD INDIAN CUSTOM

Young Indians long ago hadn't any banisters at home. But they knew all the joy and thrill of sliding fast down a nice, slippery, slanting rock. Craving for speed is nothing new in the world, says H. W. Krieger, ethnologist of the Smithsonian Institution, Washington, D. C. Mr. Krieger, just returned from Washington State, obtained for the Smithsonian records this photograph of Martin Spedis, chief of Wishram Indians, demonstrating an old rock slide where he played as a boy. Grooves four or five inches deep have been worn down this hard basalt rock during many centuries while countless little Indians and big chiefs, too, wore out their clothes and had their fun. The sliding rock is at Spearfish, ancestral home of Wishram Indians, and soon to be the far end shore of a 60-mile lake, when waters backed up by Bonneville Dam flood the region.



## PUBLIC HEALTH

**Experts Find Pneumonia Deathrate Unusual**

**F**IGURES for pneumonia deaths per 100,000 of the population during the last few years have surprised health experts. Something apparently has happened to the affinity between pneumonia and influenza deathrates.

High deathrates for these two diseases usually go together, but during the year just ended and also during the year 1932, the picture was reversed, statisticians of the Metropolitan Life Insurance Company report.

In 1934, reports from all over the country showed the lowest number of influenza cases in many years and the influenza mortality rate among the insurance company's industrial policy holders was one-half that of the previous year. Contrary to expectation, however, there was a pronounced increase in the pneumonia deathrate in the United States. On the other hand, 1932 began with an influenza epidemic and closed with the lowest pneumonia deathrate on record up to that time.

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## ASTRONOMY

**British Astronomer Lists Sizes of Constellations**

**W**HAT constellation occupies the greatest area in the sky? The answer to this question is given by A. E. Levin, British amateur astronomer, in the 1935 Handbook of the British Astronomical Association, just issued. Mr. Levin has calculated the proportion of the sky occupied by each of the 89 constellations recognized by modern astronomers, and gives a list of their areas.

Hydra, the water snake, a somewhat inconspicuous group of stars that can be seen in the southern sky during evenings of spring, is the largest, occupying more than three per cent. of the sky. Virgo, the virgin, which is also visible in the spring evenings, in the south just above Hydra, is a close second, also covering more than three per cent. of all the sky. Ursa major, the great bear, of which the great dipper is part, is third, accounting for just over three per cent. Cetus, the whale, now visible in the southern evening sky, is fourth, with a little under three per cent. of the total; while Hercules, seen overhead on summer evenings, comes fifth, but is only

slightly smaller. Orion, perhaps the most conspicuous constellation and now prominent in the eastern evening sky, comes twenty-fifth, with less than one and a half per cent.

The smallest constellation is Crux, the southern cross, which is visible from southern countries. Equuleus, the little horse, a constellation of faint stars visible in the southern evening skies in early autumn, is second smallest and Sagitta, the arrow, now visible in the early evening in the west, just to the right of the bright star Altair, marking Aquila, the eagle, is third smallest. Each of these three groups accounts for less than a fifth of one per cent. of the sky's area.

*Science News Letter, January 19, 1935*

## PALEONTOLOGY

**Mastodon Headquarters Found Near St. Louis**

**M**ORE than three million years ago a mastodon metropolis existed 20 miles south of St. Louis, according to D. K. Greger, curator of the Department of Geology of Washington University, St. Louis. He is now restoring the sections of a fossilized mastodon recovered by two University scientists, Dr. George D. Snell and Paul A. Nicoll.

The bones were found in a district surrounding Koch Creek on the Lemay Ferry Road, near Kimmswick. This region was evidently a gathering place for prehistoric elephants, as about 20 skeletons have found there since 1856. The best one is now in the London Museum.

Mr. Greger hopes in the near future to restore some of the skeleton sections which are now on display in Wilson Hall. The job of restoration is a difficult one, as the pelvis of the mastodon will be the size of an office desk when completed.

The mastodon had two sets of tusks, the two large upper ones being devoid of enamel and curving upward. The jaw, of which there is an excellent specimen in the research office, contains large molar teeth which were replaced by another set of teeth if the animal lost them.

Trees, shrubbery, grass, and other forms of vegetable matter were their chief diet. During the glacial age they were triply protected from the cold by one long coat of hair and two woolly coats.

*Science News Letter, January 19, 1935*

**IN SCIENCE**

## PHYSIOLOGY—CHEMISTRY

**Animals "Go to Sleep" In Heavy Water Bath**

**S**OMETHING very much like hibernation, or the almost death-like sleep in which certain animals rest for parts of their lives, can be produced by heavy water, containing the recently discovered double-weight hydrogen atoms. Experiments indicating this were reported before the meeting of the American Association for the Advancement of Science, by Dr. T. Cunliffe Barnes and E. J. Larson of Yale University.

Dr. Barnes and Mr. Larson used flatworms, a relatively primitive life-form, in their investigations. Flatworms kept for months in a dilute solution of heavy water in ordinary water were still the same size as they had been at the start. Other flatworms, kept in pure ordinary water as "controls," had lost four-fifths of their size after the same period. Slower chemical reactions of digestion, and slower life-processes generally, indicated the "sleepiness" of the animals in the heavy water solution.

*Science News Letter, January 19, 1935*

## PLANT PHYSIOLOGY

**Sprays Kill Dandelions, Spare Grass in Lawns**

**D**ANDELIONS are killed and lawn grass left alive by several kinds of spray material tested by Dr. W. E. Loomis and N. L. Noecker of Iowa State College, Ames, and described before the American Society of Plant Physiologists. Kerosene and other petroleum distillates are used, in some cases with the addition of furfural, a chemical producible at extremely low costs from oat hulls and other grain wastes. The furfural emulsions have resulted in 95 per cent. kill of dandelions with one application.

Best results are obtained when the spraying is not done in hot weather, but either in early June or at the beginning of the fall growing period, about Sept. 1.

*Science News Letter, January 19, 1935*



# EN FIELDS

## PHYSIOLOGY

### Beer Fattens Because it Is Food as Well as Drink

**I**F YOU are undernourished and feel that beer will build you up, medical science is prepared to recommend that you add the beverage to your usual diet.

You can silence your critics by the scientifically attested statement that it is not only the alcohol in the beer that is building up your weight. *The Journal of the American Medical Association* (Dec. 21) says editorially that only half of the calories in German beer are derived from alcohol; the rest come from "dextrin and protein-like extractives" in the beer. Here is food material "whose fattening properties may be very highly considered," according to one medical authority cited in the *Journal* editorial.

The editorial calls attention to the alcoholic content of domestic beers which were analyzed before and after repeal. Thirty-seven light beers analyzed before repeal had an average alcoholic content of 3.7 per cent. The maximum content was 4.64, and the minimum 3.01. Of ten light beers (many of the brands included in the earlier analysis) the average alcohol by volume was 4.64 per cent., the maximum 5.23 and the minimum 4.02.

*Science News Letter, January 19, 1935*

## GEOLOGY

### Artificial Sand Dunes Protect Beach Highways

**S**AND dunes may rouse in the mind's eye only a picture of swarthy sheiks cavorting on camels through the trackless desert; but they have a much more domestic function. Right here, in these United States, they are very useful in protecting beach roads along which travel caravans of everyday automobiles.

At the meeting of the American Shore and Beach Preservation Association in Washington, W. W. Mack, chief engineer of the Delaware State Highway Commission, told how artificial encouragement was given to dunes, to get them to grow where no dunes grew

before, in order to protect a Delaware highway which was exposed in spots to the onset of murderous waves kicked up by great storms.

The highway was located behind a line of natural dunes in the first place, because of the protection these afforded. Where gaps occurred between the natural sand mounds, plank fences were set up to check the blowing sand, and to cause it to heap up like snow about a snow fence in the West.

An unusually severe test was given these "fence-dunes" by an exceptionally big storm. Where the sand had had time to become well heaped about the fences they withstood the attack 100 per cent. Newer portions, not yet well covered with sand, were wrecked.

*Science News Letter, January 19, 1935*

## PHYSICS

### \$900 Chunk of Gold Used on Atom Tests

**W**HAT a nation does with its gold when it is off the gold standard is revealed in the British science journal *Nature*. (Dec. 22) Part of the gold locked, by decree, within a country is used for scientific research.

Such is the case in Poland, which forbids shipments of gold from within its boundaries. In Warsaw a group of investigators headed by M. Danysz of the Radiological Laboratory have just completed atomic experiments involving a block of gold valued, in American dollars, at about \$900.

The investigation, using the nugget loaned by the Bank of Poland, was to determine what difference a gold filter process would have on the penetrating power of the neutrons. Neutrons are fundamental particles of which all atoms are made.

Danysz and his colleagues find that in silver and iodine much more artificial radioactivity is produced by neutrons when they are first filtered by passing them through the gold block than without the filtering process. For light elements like aluminum and silicon the reverse was true.

The Polish scientists suggest as an explanation, that the neutrons entering the gold strike atoms there, are stopped, and in stopping create other neutrons of slightly less energy. Such slow neutrons are efficient in producing artificial radioactivity in heavy elements like silver and iodine but are inefficient in doing the same thing on the light elements.

*Science News Letter, January 19, 1935*

## CHEMISTRY

### New Metal Used to Ship Hydrochloric Acid

**A** LONG-baffling problem of chemistry—how to ship and store highly-corrosive hydrochloric acid in something other than glass bottles—at last has been solved.

The rare element rhenium, discovered so recently as 1925, is the answer to the problem with which chemistry has been struggling for years.

Speaking before the meeting of the Electrochemical Society, Prof. Colin G. Fink and chemical engineer P. Deren of Columbia University, revealed that they have finally discovered a way to plate rhenium on brass, copper and other metals. Rhenium is very resistant to hydrochloric acid. The discovery, declared Prof. Fink, should be of the greatest importance to industry.

The acid could be shipped cheaply in tank cars lined with rhenium and stored in rhenium-linked tanks. When applied in industry the discovery will do away with the familiar, but costly, method of shipment and storage in glass bottles protected by heavy wooden containers.

The new discovery will place hydrochloric acid on a par with sulphuric and nitric acids with regard to transport. The last two acids can be shipped and stored in large quantities in suitable metal containers. Up till now this has not been possible for hydrochloric acid.

Rhenium is one of the heaviest metals among the chemical elements. Its atomic number is 75 and it is about as heavy as tungsten. The pure metal has a bluish color. It was named by its German discoverer, Noddack, after the river Rhine.

While rhenium is widely prevalent in the earth's crust, no deposits have so far been located which yield more than a trace of the metal. Even in the richest ores it is present only in from 2 to 20 parts per million. At this concentration, Dr. Fink declared, it did not pay to mine the ore for rhenium alone.

It has recently been found, however, he declared, that rhenium is present in the slime waste products from copper refining plants in about one part per million. This, in effect, is a source of rhenium already "mined." The "mining cost" has been paid by the copper refining.

From such copper wastes pure rhenium is obtained at a price which makes its cost nominal.

*Science News Letter, January 19, 1935*

ENGINEERING

# Pictures by Radio?

## Simple Receivers for Facsimile Transmission Plus Development of Now Unused Waves Hold Promise

By ROBERT D. POTTER

**B**ULLETS from an assassin's gun kill King Alexander of Yugoslavia. Pictures taken by alert news photographers at the scene of the crime, in France, appear the next day in American newspapers, thanks to radio and wire transmission of facsimiles. A miracle—Yes! But only the forerunner of things to come in picture transmission.

New receivers for unscrambling radio waves which carry the pictures, and even new types of radio waves never before utilized commercially, offer the possibilities for an attractive future in the field of radio facsimile transmission.

When that day comes—and it is not far ahead—present systems of transmission may seem as antiquated as the model T Ford does to its current offspring and its competitors. There is more than an even chance that by the new developments in the field of facsimile transmission single pictures may be received at such speed that they will come to "life" and become television in a practical sense.

Miracle that it is, radio facsimile transmission of pictures works best—at present—across oceans where it cuts days to hours in bringing a picture to a receiving newspaper. Yet the hours of time still required consist of more than 99 per cent. details of transmission and receiving and only a brief instant in actual transit. Radio waves, remember, travel 186,000 miles a second.

### Scrambled Jig-Saw

The present arrangement is like dropping a completed jig-saw puzzle from the Washington Monument. It comes apart at impact with the ground and must be reassembled. The time of transmission from top to ground is but a small fraction of the time for the complete job.

Picture a Washington Monument so tall that it takes days to walk down it and one sees the gain in time by the present "breaking-up" arrangement. For the real monument it is faster, everyone will agree, to carry the puzzle down intact.

The present arrangement of facsimile transmission, by this picture, is useful for very "long monuments," equivalent to the width of the Atlantic Ocean. For the situation in the United States it is but little faster, if any, to break up a picture into radio signals and reassemble it at the receiving end; not, at least, when great cities like New York and Chicago are but a little more than three hours apart by airplane.

What lies ahead for facsimile transmission may be just as great an improvement over the present systems as the latter are over picture transmission via ocean vessels across the Atlantic. If present methods cut days to hours, future devices should cut hours to minutes and seconds. Already pictures have been transmitted experimentally in five minutes which would require over an hour by the present facsimile transmitting systems. And the end is not yet in sight.

### More Than a Hope

Thus the future holds more than a hope that a time will come when radio facsimile transmission will serve as useful a place in American news photo distribution as present facsimile systems occupy in the trans-oceanic field. And every newspaper, however small, could enjoy the benefits of the new methods. Already facsimile receivers are available which might cost only \$20 or \$30 if placed in production on a commercial, instead of an experimental, basis. But more of that shortly.

Facsimile equipment today is not selling for \$30, but many times that amount. It is an intricate combination of photography, electrical engineering and radio development.

See what happens in a radio station when an important picture, such as the Morro Castle disaster or the assassination of King Alexander, is about to be transmitted across the ocean by wireless.

A tiny, brilliant pin-point of light plays back and forth across the photograph which has been wrapped around a slowly moving cylinder and moves with it. Closely adjacent to the light source is a small photoelectric cell.



### AN EARLY PRINT

*This lovely lady is pictured by carbon copy reception process while it was still in the experimental stage.*

Where the light beam strikes the blacks in the photograph little light is reflected and picked up by the photocell. Where white or light grays occur, the reflection is stronger. Thus, as the picture is "scanned" bit by bit, the photocell generates an electric current whose strength is a measure of the blackness or whiteness of each section of the picture.

The changing photocell current is, of course, most minute but nearby amplifiers "pep it up" enormously until it is capable of changing or modulating the signal being sent out by the transmission aerial. This puts the picture "on the air" and flashes it to its destination in a fraction of a second.

Now jump over to the receiving station. In essence the receiving process is transmission in reverse. The incoming picture signal is weak, and first must be amplified millions of times. A home radio receiving set does the same thing. Instead of worrying about making pictures, however, it produces oscillations in a loudspeaker.

The picture receiver consists of a rotating cylinder turning at the same prearranged speed as that of the transmitting station. On its surface is an unexposed photographic film. Again a point of light scans its surface with an



intensity changing as the incoming signal modulation varies. Remember those variations mean degrees of black and white and the in-between grays.

Gradually, as the film turns, the entire surface is exposed to the pin point of light and when developed in a dark room resembles closely the original "master" picture. The whole process of exposing the film bit by bit and developing it must, naturally, be carried out in darkness.

So that the operator will know what is going on, however, a crude auxiliary system produces a rough replica of the picture by spraying ink from a small nozzle onto paper. The thickness and blackness of the applied ink is varied with the incoming signal. This novel monitor device operates in daylight and, in substance, the ink spray takes the place of the light beam exposing the photographic film in the sealed, darkened apparatus.

R. C. A.-Victor in its research laboratories at Camden, N. J., has realized the device just described was not perfect, or the ultimate in picture transmission. Progress in the art has been steady. Charles J. Young, one of their research engineers, has just perfected a new form of facsimile receiver which is a step toward the \$30 receivers previously mentioned.

Young Mr. Young—son of Owen D.

Young—has improved the photographic receiver by the substitution of the principle of making carbon copies on a typewriter for the photographic prints.

Compare the time and cost of making a carbon copy and a photoprint and the reader will realize why the former brings in the important low cost and speed angle.

Externally the carbon copy receiver looks little different from the photographic device. No method yet seems to be able to get away from the rotating cylinder idea.

In Engineer Young's method, however, there is no photographic film being exposed piece by piece by a light spot. Instead, the rotating cylinders simply have a paper "sandwich" fixed to their surface consisting of two sheets of white paper with a carbon sheet between them.

Instead of a fluctuating light beam varied by the incoming picture signal, a helical stylus presses against the top white sheet of paper in varying amounts. Where the radio signal says, in effect, "here is black" the stylus presses heavily against the paper and the carbon and thus transfers a black mark to the bottom sheet. Where the signal says, "here is white or light gray," the pressure on the stylus is removed or reduced and the carbon wax is transferred lightly or not at all to the bottom sheet.

The carbon copy method removes at one stroke all need for photographic development of the picture, all need for an auxiliary monitor sprayed ink apparatus and the need for light beams for exposing the film. Mr. Young's device may not be the final form of facsimile receivers but it is relatively simple and cheap to operate. More important, it marks the rapid progress of an art that is gaining momentum so fast that the investor in present equipment might well await future development to avoid the installation of what tomorrow may be obsolete equipment.

### Develop Microwaves

Coupled with Mr. Young's receiver as typifying progress in radio picture transmission is the development of the micro-radio waves for commercial use. Microwaves, as they are called for short, are the smallest radio waves which science has yet been able to produce with vacuum tube equipment.

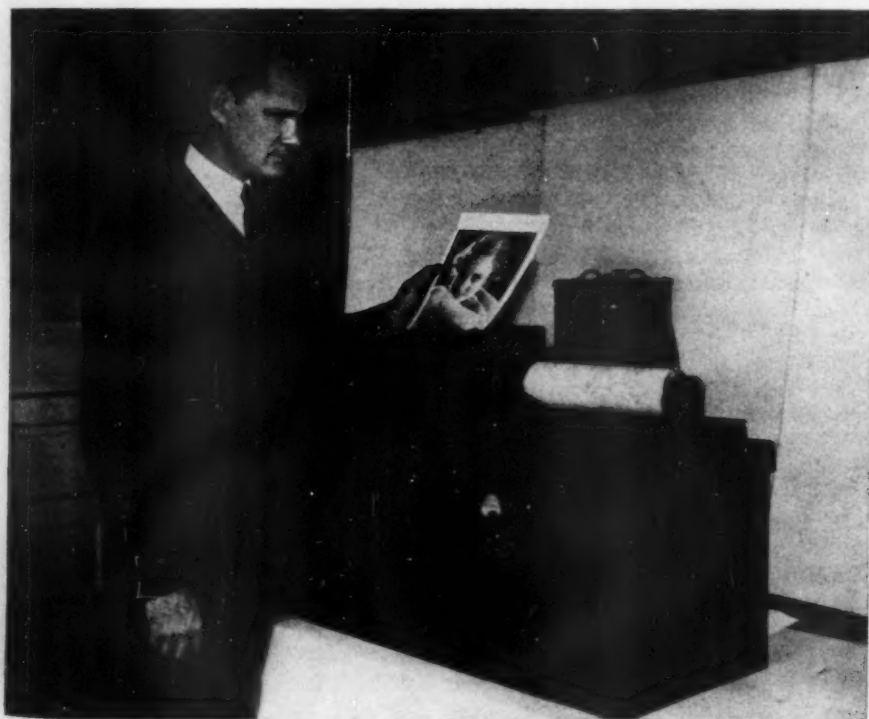
Where the radio waves for sound broadcasting are hundreds of meters long—thousands of feet from crest to crest—microwaves are measured in inches. They are far shorter than the so-called shortwaves used by radio amateurs, measuring fifty or seventy feet in length.

Strangest characteristic of micro-radio waves is their property of being able to be focused like light with strongly directional effect. When transmitted they can be sent in a nearly parallel beam by suitable reflecting "mirrors." A concentration of intensity at a distant point is thus possible. Ordinary broadcast radio waves are sent out in all directions. Much of their energy is wasted. Where thousands of watts of power is sent out only a few thousandths of one watt is received in your home set.

### Limited Range

The light-like properties of microwaves are at once useful and a handicap. Marconi, "father" of wireless, employs the directional effect of microwaves in his radio fog beacon for ships entering a harbor "blind." By receiving an accurately directed beam the ship's captain can take bearings even though he can not see the shore or familiar landmarks.

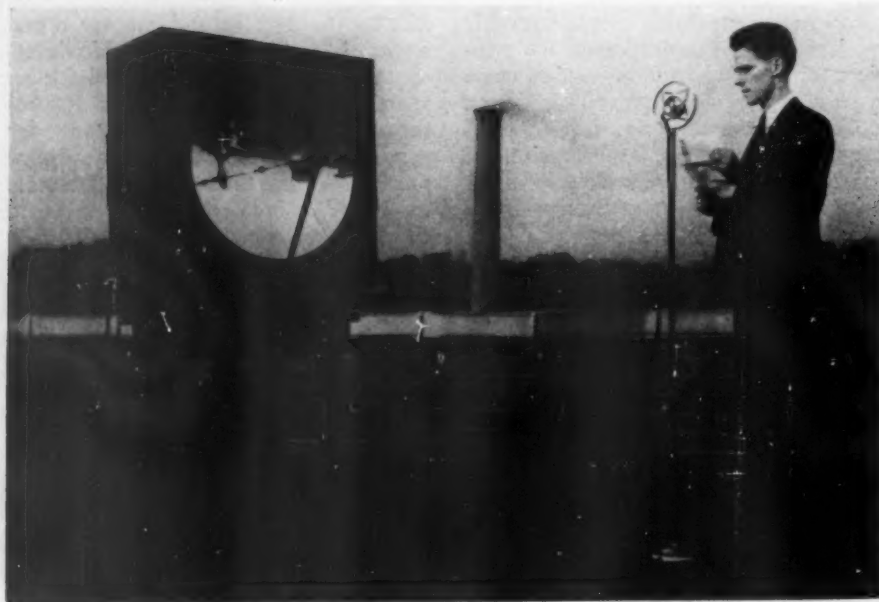
On the handicap side, the optical properties of microwaves mean that their range of usefulness on the earth is limited by the distance of the horizon. From a tall skyscraper like those of New York fifty or sixty miles transmission is the maximum distance possible. Scien-



SIMPLIFIED FACSIMILE RECORDER

C. J. Young, son of famous Owen D. Young, is demonstrating his device which eventually may sell for about thirty dollars.





#### BROADCASTING ON ULTRA-SHORT WAVES

*G. R. Kilgore, research engineer of Westinghouse Company, broadcasting on radio waves only a little over 3 inches in length. In the microphone the voice is turned into electric impulses which are sent into space at the focus of the mirror. The mirror sends out the signal as a parallel beam. A similar mirror receiver several miles away picks up the message.*

tists of the Radio Corporation of America working on the problem of microwave transmission will get around this difficulty by having "booster" stations every sixty miles in a country-wide network linking the large cities.

While booster stations will involve expenditures of large amounts of money for equipment, the development will be worthwhile because of freedom from static. Static on audible broadcast means a blurring of the speech. In facsimile transmission it means a smudging of the picture or original message. The received facsimile sent through static may be like a letter written in ink and then smeared before drying. Only on microwaves, where static does not occur, can facsimile transmission be accomplished with 100 per cent. success all the time.

Present radio transmission yields pictures which, if taken in the home town of the newspaper, would seldom be printed. They are blurred, tend to be smudgy and lack detail. They are used because of their great news interest and to some extent because of their novelty at the present time. Everyone, publishers, photographers and reading public alike wish to have them better. Greatest of the advantages which microwave radio waves will bring to facsimile transmission is an increase of detail in the resulting picture.

Microwaves should bring as big an

improvement in radio pictures as a fine magazine photoengraving screen does compared to a very coarse fifty-line screen. The little dots characteristic of the latter disappear in fine photoengraving because the dots, while still existent, are so close together the eye cannot resolve them.

One could become lost in the technical radio details proving that increased detail is an accompaniment of the use of shorter and shorter radio waves as the carriers of the picture signals. But suffice it to say that for a picture split up into 50 sections per inch up and down and across, a radio band of frequencies equal to 50 times 50, or 2,500 cycles is required. And the result is coarse; equivalent to a rough 50 line photoengraving screen.

For better detail at ordinary radio wavelengths the facsimile channels would be so broad there would be little else "on the air." Broadcasting on the longer wavelengths for sound is crowded enough without trying to contemplate the mixture which would result if facsimile transmission with its much wider "bands" came into being on those same wavelengths.

Fortunately, because the frequency separation spreads out rapidly as one goes to short microwaves, broad bands can be obtained and yet crowding avoided. In television where the transmission bands need to be even wider,

microwaves appear to be an absolute necessity.

Compared to the broadcast radio waves, the short waves of the amateurs are the "great open spaces." Microwaves, in turn, would be a "wilderness." No one, however, likes to go into a wilderness. It is an uncharted, unmapped sort of place. Pioneer work is necessary whether the wilderness is a new country or a new radio region.

Microwave facsimile transmission is so encouraging to the radio engineers because it is a wholesome sign of progress in the wilderness.

But out of the wilderness are coming prophets. Their prophecies are more than wish fulfillment. Hard-won scientific discoveries and new techniques are behind them. The promised days of still more progress are not now too far ahead.

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#### ASTRONOMY

### Year's First Comet And Unidentified Object Seen

**A** NEW object in the heavens, discovered by a British amateur astronomer, has been reported to the astronomical world through the International Astronomical Union bureau.

It may be an asteroid or a comet. Although it is tenth magnitude and too faint to be seen with the unaided eye, it is located in the constellation of Taurus, the bull, west of the bright star Aldebaran in the evening sky.

Discovered on Jan. 6 by Geoffrey Francis Kellaway, who lives in the Somerset county of England, the new object was confirmed by Dr. A. C. C. Crommelin before being reported. It will be known as the Kellaway object. The object has no tail but does have a bright center or nucleus.

The astronomical coordinates at discovery were right ascension 4 hour 25 minutes 24 seconds and declination north 16 degrees 11 minutes and the daily motion is in right ascension plus two minutes 8 seconds and in declination plus one minute.

A comet, discovered from Union Observatory at Johannesburg, South Africa, by Astronomer E. L. Johnson, is the first of the new year.

But it is not visible from the northern hemisphere, and even south of the

equator a telescope of some size is necessary. It will be called Johnson's comet.

The astronomical location of the presumably new comet is right ascension one hour and south declination 51 degrees three minutes, which means that it is in the southern constellation of the Phoenix. Its brightness is reported as 10.4 magnitude, whereas an object in the sky must be sixth magnitude in order to be seen by keen, unaided eyes.

News of the discovery, made late

Tuesday night, Jan. 8, was reported to the central bureau for astronomical information at Copenhagen, whence astronomical news is cabled to the observatories of the world. The comet is moving about a degree a day southward but more observations and extensive computations will be necessary before astronomers can say whether it will grow brighter, when it is likely to return, or how long it will remain with us at this time.

*Science News Letter, January 19, 1935*

#### ASTRONOMY

## End of Earth Foreseen When the Sun Explodes

THE end of the earth may occur when the sun suddenly explodes, Dr. Fritz Zwicky of the California Institute of Technology suggested in a statement prepared for Science Service.

Discussing the gigantic outbursts of stars that are "the most colossal catastrophes of matter which man has ever been privileged to witness," Dr. Zwicky pointed out that our sun may some day become what is called a super-nova.

Should the sun explode, Dr. Zwicky explained, "this friendly planet on which we live would shortly be nothing but a cloud of hot gases drifting in space."

Until we know more about what makes stars explode, Dr. Zwicky explained that we are still in the position of the lady who anxiously asked a famous astronomer:

"How long, professor, did you say the sun would last?"

"A few billion years at least," answered the astronomer.

"Thank heaven," exclaimed the lady, "I thought it was only a million years."

Stars to the ancients were symbols of the eternal and unchangeable, Dr. Zwicky said. Now it is known that changes are occurring among the stars and one of the major problems of modern astronomy is to unpuzzle the origin, existence and death of stars.

One of the great star explosions occurred on Nov. 7, 1572, when the famous Danish astronomer, Tycho Brahe, saw a strange new star in the constellation of Cassiopeia. It could be seen in the daytime and outshone all the others for several weeks. Then it gradually waned to such dimness that not

even with the largest of modern telescopes can astronomers discover its remains.

Dr. Zwicky estimates that relatively small telescopes watching the great stellar systems, called nebulae, outside our own Milky Way should be able to locate occasional super-novae, and that if a thousand nebulae were observed, about one super-nova a year should be discovered. Only with very great luck is there a chance of observing one of these stellar guests in the Milky Way during one lifetime.

The "new star" or nova that blazed forth near Vega last month, visible to the unaided eye even now, is not the type of stellar guest, as Dr. Zwicky calls them, that deserves the name of super-nova. It is one of the more frequent common novae. Studying with Dr. W. Baade of Mt. Wilson Observatory the super-novae recorded in history, Dr. Zwicky concludes that they originally were quite ordinary stars, that the amount of radiation that is given off when they explode results from the annihilation of a great part of the star's mass, that the explosions represent a sort of grand finale converting the stars into bodies of high density and small diameter, that cosmic rays may originate in these super-novae.

Dr. Zwicky discussed these stellar guests in a nation-wide radio talk over the Columbia Broadcasting System under the auspices of Science Service.

*Science News Letter, January 19, 1935*

Woolen roads are no joke—some road facings are being made of wool and tar mixtures.

#### PHYSICS—MEDICINE

## Experiments Compare Value Of Radium and X-Rays

NEW scientific tools for investigating how well radium rays and X-rays act on the human body have just been developed by the National Bureau of Standards.

The apparatus, using blocks of wax instead of the human body to scatter the rays, and a mixture of three fluids having atomic patterns similar to the body tissues to absorb the radiation, may prove useful in helping to decide the old question of when to use and when not to use radium in treating deep-seated cancerous tissue.

Often radium rays work better than X-rays but frequently the opposite is true. Physicians, in the past, have only been able to determine this fact by actual body therapy. Now, it is hoped, a laboratory test can decide the problem in advance of clinical treatment.

Lauriston S. Taylor, of the X-rays standardization section, and Dr. F. L. Mohler, head of the atomic physics section of the Bureau, are the developers of the new ray-measuring equipment.

"While it has been possible," Mr. Taylor said, "to measure separately the ionization of radium and X-rays it has not been possible to compare accurately the results of two such tests and decide definitely when and where each may be most efficiently utilized."

"Any suitable method of measuring these rays must be carried out under conditions which physically are the same as those encountered by the radiation when it enters the body."

"To accomplish this we have constructed apparatus which measures the radiation in liquids instead of gases. These liquids have the same atomic properties as the body tissues." The fluids, he added, are carbon bisulphide, tetrahydronaphthalene and a fluid known as ligroin.

A fine, screen-like mesh of wires properly insulated is immersed in this combination liquid and the ability of the rays to ionize atoms by knocking off electrons is measured.

Below the ionization screen, Mr. Taylor explained, are a series of wax blocks which scatter the rays backward after the fashion of the human body in radiation therapy. These wax blocks are known as "phantom" bodies and take the place of a body in tests.

*Science News Letter, January 19, 1935*



## PHYSIOLOGY

# Those Most Sensitive to Electricity Stand Shock Best

**J**UST as some persons see better than others, some animals are able to withstand electric shocks—seemingly without injury—that cause other animals to suffer permanent harm.

This is one of the discoveries of Dr. W. B. Kouwenhoven, Johns Hopkins University electrical engineering professor, who with a group has been investigating the effect of electric shocks with the ultimate purpose of saving human lives and making the use of electricity safer.

One seeming paradox which he reported to the New York Electrical Society is that rats most sensitive to small amounts of electricity have the greatest resistance to electric shock.

This bears out the experience of electrical workers and linemen in the field, Dr. Kouwenhoven said. Electrical workers found that those among them who feel the weakest currents are best able to withstand and recover from strong shocks. The reason for this resistance of sensitive individuals has not yet been discovered.

The relation of resistance and sensitivity to electricity was discovered in the course of studies which have been made on rats. In one experiment the animals were placed in a basket through the bottom of which a weak electric current was passed. At first the rats did not seem to notice the electricity. Then as the amount was gradually increased, some of the animals stopped feeding and jumped out of the basket. Others did not interrupt their feeding until a stronger current passed through the grid at the bottom of the basket.

## Two Groups

The rats were divided into two groups, sensitive and comparatively insensitive. Dr. Kouwenhoven and his associates expected the more sensitive animals to suffer greater injury from a stronger electric shock. To their surprise, the sensitive animals showed the greatest resistance.

Best method of reviving a person shocked by electricity is the Shaffer prone pressure method of artificial respiration, which is also used to revive

victims of drowning accidents and gas poisoning. The artificial respiration should be started as soon as possible, Dr. Kouwenhoven said, and should be kept up until rigor mortis, the stiffening or rigidity which follows after death, sets in. This is because the heart may be beating enough to keep the brain and the rest of the body alive even when beating so feebly that its pulsation cannot be detected by a stethoscope, he explained.

## Danger at Home

The danger of death from electric shock from the ordinary household current was stressed by the scientist. He and his associates found that alternating current is much more dangerous at low voltages than at high voltages. On high voltages the muscle contraction may be severe enough to throw the person away from the contact with the electricity, while on low voltage circuits it is often impossible for him to let go. Low voltage direct current is not nearly so dangerous as low voltage alternating current. There is only one authentic record of a man being killed by 110 volts from a direct current circuit, but there are many such deaths from the 110 volt alternating circuits. The danger from household circuits is particularly great in bathrooms, cellars, garages and other damp places.

Never reach for an electric device while in the bathtub or while still wet from the bath, Dr. Kouwenhoven warned. Don't use an electric curling iron in the bathroom. He noted with approval the Massachusetts law which forbids placing electric switches inside the bathroom. Neither switchplates nor pull sockets should be within reach of the bathtub, and there should be no electric heaters in the bathroom.

Low voltage shocks kill because of their effect on the heart, the Johns Hopkins scientists have found. The low voltage current puts the heart into the state called fibrillation, which means that the heart fibers, instead of all contracting together as a unit, contract separately. The force of these separate contractions is not great enough to pump

the blood and the animal soon dies. A strong shock will stop the heart action all at once, it was found, and the victim may then be revived by artificial respiration.

Dr. Kouwenhoven and associates have found a strong counter-shock will stop the fibrillation caused by low voltage shocks and give the victim a chance to be restored. However, he has so far applied this method only to animals.

They have in this way revived animals dead of electric shock for as long as five minutes, but after five minutes, while the heart action can be started, the animals die. The reason for the failure, Dr. Kouwenhoven believes, may be that the nursing given after the heart action started was not good enough. Since animals can not tell how they feel, it is difficult to give them the efficient nursing care that can be given human patients.

*Science News Letter, January 19, 1935*

## PUBLIC HEALTH

## Demand For Spotted Fever Vaccine Rises

**T**HE number of requests for Rocky Mountain spotted fever vaccine received at the U. S. Public Health Service's Laboratory in Hamilton, Mont., was nearly 50 per cent. greater this year than last, Dr. R. R. Parker, who is in charge of the laboratory, has reported.

It is at this laboratory that government scientists carry on the dangerous task of making the vaccine to protect ranchers, sheepherders and others whose occupation exposes them to the highly fatal disease.

Over 212 quarts of the vaccine were made during the 1934 season. Of this amount, about 80 per cent. was suitable for use. The demand, however, exceeded the supply. It was necessary to refuse many urgent requests and many others could not be filled completely.

A little less than two quarts of the precious stuff was sent to Brazil, at the urgent request of the Brazilian government, for use in the region of Sao Paulo, where the disease is prevalent in the same highly fatal form as that found in certain sections of western United States.

Much of the work at the laboratory has been seriously hampered by lack of funds. Studies of the relationship of spotted fever to other similar diseases; studies of the tick that carries the disease; field surveys of the prevalence and



habits of the ticks and animals in the Rocky Mountain and adjacent area; spotted fever treatment studies; and a long-term investigation under way for several years past, to determine the causes of variations in the virulence of the spotted fever virus all had to be greatly curtailed or altogether stopped. Only the vaccine production went on, but even this was hampered somewhat by the construction activities in connection with building a new laboratory and remodeling the old one.

Science News Letter, January 19, 1935

#### PHYSIOLOGY

### Infant's One-Pound Weight Called Outstanding

"AN infant that weighed sixteen ounces at birth and that lived to be forty-three days old with a gain of two ounces is an outstanding record."

This comment on the reported record-breaking one-pound baby of El Paso, Texas, was made to Science Service by Dr. Julius Hess, of the University of Illinois College of Medicine, who has made a special study of premature infants of small size and weight.

According to Dr. Hess, the El Paso baby breaks the record for small birth-weight by five ounces.

"To my knowledge the smallest infant recorded in the literature that lived through its third year weighed one pound and five ounces," Dr. Hess said.

One other baby in this class, seen by Dr. Hess in Chicago, weighed one pound, three and one-half ounces at birth and lived twelve days.

Such so-called "midget" babies are not dwarfs in the true sense of the word but are infants who are born prematurely. Babies weighing two pounds or less at birth have a very small chance of surviving. At the premature infant station at Michael Reese Hospital, Chicago, there have been cared for over a period of a few years some 83 infants whose weights at birth or shortly thereafter were under 1000 grams (about two pounds). Of these 65, or three-quarters, died.

When these tiny babies do survive and grow up, they usually become perfectly normal persons both physically and mentally.

Science News Letter, January 19, 1935

Letters by George Washington show that he recognized the bad effects of soil erosion on his own farms and took steps to "bind together and prevent the earth from gully-ing."



#### One Acre: One Man

THE TINY peasant-owned farms of France, meticulously cultivated to the last centimeter by the patient labor of human hands—and backs—have long been standard subjects of travel-comment, whether in sympathetic admiration by the more discerning, or in derisive superiority on the part of victims of the common American disease of megalophilia. To all of us, however, it has seemed something alien, something quite out of our world, that any people should actually still be living by the ancient rule, "one acre, one man"; that there should have survived into the twentieth century a rural ecology which even in the eighteenth century Oliver Goldsmith lamented as already past for England:

"When every rood of ground maintained its man."

Yet even in our America, America of the mile-wide farms and Western rangelands still resentful of any fences at all, the land averages out to something like the old-time, Old-World acre-man ratio, at least so far as first-class land is concerned. So says Dr. Isaiah Bowman, director of the American Geographical Society and chairman of the National Research Council, in the current issue of the *Geographical Review*.

"Today there is only one acre of first-class land per inhabitant of the United States, and only one additional acre of second-class land," he states. "Marginal, submarginal and doubtful land amounts to five acres per person and desert or otherwise useless land, six acres."

Nevertheless, the crux of the farm population problem, in Dr. Bowman's opinion, is not lack of land but maldistribution of population on the land. He says:

"The federal government has embarked upon a scheme for the purchase of submarginal land. Anyone who has examined at first hand some of the precarious homesteads in the semi-arid and arid West will agree that it is better to buy out a family and subsidize it for a fresh start than to supply it with food four years out of five as a measure of charity."

"When whole counties are in distress and require state or national help for a period of years it is time that at least experimental efforts be made to improve the lot of the settler. Rural slums are as definite a menace as city slums."

Science News Letter, January 19, 1935

#### MEDICINE

### Sheep Die of "Rabbit Fever," Carried by Ticks

SHEEP in the Northwest developed a highly destructive epidemic of tularemia or "rabbit fever" last spring, which Dr. Cornelius B. Philip, U. S. Public Health Service, told the American Society of Parasitologists was borne by the parasitic ticks common on the range.

Corroborative evidence included the death of many jackrabbits from tularemia at the same time, the discovery of tularemia bacteria in the bodies of some of the ticks, a case of tick-transmitted human tularemia, and bacteriological tests on the blood sera of diseased sheep.

Dr. Philip had as associates in the research William L. Jellison, Rocky Mountain Spotted Fever Laboratory of the U. S. Public Health Service, and H. F. Wilkins of the Montana Livestock Sanitary Board.

Science News Letter, January 19, 1935

Cranberry rye bread is a new bakery food, says Cornell University.

## ● RADIO

Tuesday, January 22, 4:30 p. m.

OUR STONE-PELTED PLANET, by H. H. Nininger, of the Nininger Laboratory.

Tuesday, January 29, 4:30 p. m.

DIGGING UP HISTORY, by Horace H. F. Jayne, Director of The University Museum, Philadelphia.

In the Science Service series of radio addresses given by eminent scientists over the Columbia Broadcasting System.

# •First Glances at New Books

## Radio

**RADIO ROUND THE WORLD**—A. W. Haslett—*Macmillan*, 196 p., \$1.75. What radio is all about written in the familiar and pleasing British conversational style made so popular by Jeans and Eddington. In the very first chapter one reads, and enjoys, a discussion of what Maxwell's electromagnetic equations mean and how Hertz proved that wireless waves exist years later. Before one is through, radio in medicine, television and wartime communication are presented, all in the same pleasing non-technical fashion. In the boom days of radio this book might have been a best seller but it is a better book for having waited to be written.

*Science News Letter*, January 19, 1935

## Child Psychology

**FAITH OR FEAR IN CHILD TRAINING**—Margaret W. Eggleston—*Round Table Press*, 191 p., \$2. Written for the guidance of mothers from the point of view of the religious educator.

*Science News Letter*, January 19, 1935

## Climatology—Physiology

**LIVING WITH THE WEATHER**—Clarence A. Mills—*Caxton Press*, 206 p., \$1.50. This book might be termed "the human side of climate" with a most peculiar appropriateness. Dr. Mills discusses physiological and psychological reactions of individuals and races to their climatic backgrounds, and the effects on these reactions of such factors as occupation, social background and the use of stimulants and depressants. He holds, for example, that in our sometimes too-bracing North American climate a moderate use of alcohol brings beneficial relaxation, but considers pernicious our national addiction to coffee.

*Science News Letter*, January 19, 1935

## Physics

**ELECTRONS (+ AND -), PROTONS, PHOTONS, NEUTRONS, AND COSMIC RAYS**—Robert A. Millikan—*Univ. of Chicago*, 492 p., \$3.50. The thousands of readers of Prof. Millikan's book, "Electron," first published in 1917 and revised in 1924, will welcome his new work for it is, in one sense, a third revision of the early book. The only material changed in the forepart of the volume is that needed to bring the "Electron" up to date. So much has happened in atomic physics, however,

that six new chapters have been added discussing cosmic rays, spinning electrons, positrons, neutrons and transmutation of the elements. Important, and what will someday be historical, photographs are given which make the illustrative material a vital feature of the book.

*Science News Letter*, January 19, 1935

## Physics

**UNE NOUVELLE CONCEPTION DE LA LUMIÈRE**—Louis de Broglie—*Hermann et Cie., Paris*, 48 p., 12 fr.

*Science News Letter*, January 19, 1935

## Physics

**FLUORESCENCE DES VAPEURS DANS LE CAMP MAGNÉTIQUE**—J. Grenard—*Hermann et Cie., Paris*, 47 p., 12 fr.

*Science News Letter*, January 19, 1935

## Physics

**L'ATOME DE THOMAS-FERMI**—L. Brillouin—*Hermann et Cie., Paris*, 47 p., 12 fr.

*Science News Letter*, January 19, 1935

## Physics

**L'ÉLECTRON POSITIF**—Irène Curie and F. Joliot—*Hermann et Cie., Paris*, 26 p., 10 fr.

*Science News Letter*, January 19, 1935

## Physics

**LES RADIOLLOIDES**—M. Haissinsky—*Hermann et Cie., Paris*, 25 p., 9 fr.

*Science News Letter*, January 19, 1935

## Physics

**LES CHAMPS "SELF-CONSISTENTS" DE HARTREE ET DE FOCK**—L. Brillouin—*Hermann et Cie., Paris*, 37 p., 10 fr.

*Science News Letter*, January 19, 1935

## Paleontology

**BEFORE THE DAWN OF HISTORY**—Charles R. Knight—*Whittlesey House*, 119 p., \$2.50. One of the best known among paleontologist-artists, whose ambitious restoration paintings and sculptures adorn the halls of leading museums in this country, here gathers together some of his best, and builds a most readable book about them.

*Science News Letter*, January 19, 1935

## Language

**DICTIONARY OF FOREIGN TERMS FOUND IN ENGLISH AND AMERICAN WRITINGS OF YESTERDAY AND TODAY**—C. O. Sylvester Mawson—*Crowell*, 389 p., \$2. This is more than a dictionary; it makes handily available good English equivalents to thousands of common foreign phrases, literary allusions and proverbs, as well as single words. All languages are combined in a single alphabetical listing. Teachers, editors, writers—everyone who lives by some phase of the difficult trade of words—will want this book within instant arm's length.

*Science News Letter*, January 19, 1935

## General Science

**RESEARCH AND PROGRESS**—Edited by Karl Kerkhof—*Berlin*, Quarterly, 6 shillings a year. A new magazine in English (excellent idiomatic English, too, not a bit "verdeutsch") giving popular accounts of some of the more outstanding current advances in science in Germany. The initial number contains articles by Max Planck, Albrecht Penck, Emil Abderhalden, and others.

*Science News Letter*, January 19, 1935

## Forestry

**FOREST MENSURATION**—Donald Bruce and F. X. Schumacher—*McGraw-Hill*, 360 p., \$3.50. Whether you are scaling logs or cruising timber, you will profit by the things that are in this new book by a pair of thoroughly experienced foresters. It puts the job of finding out how much wood there is in the woods on a soundly quantitative basis, making possible the elimination of much wasteful guesswork.

*Science News Letter*, January 19, 1935

## General Science

**PROBLEMS IN GENERAL SCIENCE**—G. W. Hunter and W. G. Whitman—*American Book Co.*, 688 p., \$1.72. New edition of a high school text on general science which tackles among other things such modern problems as stratosphere exploration, atomic theory, dial telephones, reclamation projects and metal alloys.

*Science News Letter*, January 19, 1935

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